

CLAIMS

We claim:

1. An isolated polypeptide, comprising an amino acid sequence that is at least 70% identical to a reference amino acid sequence selected from the group consisting of:

- (a) amino acid residues 19 to 805 of a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9,
- (b) amino acid residues 19 to 738 of a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9,
- (c) amino acid residues 19 to 708 of a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9,
- (d) amino acid residues 19 to 613 of a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9,
- (e) amino acid residues 133 to 542 of a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9,
- (f) amino acid residues 344 to 542 of a sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9, and
- (g) amino acid residues 371 to 402 of either SEQ ID NO:2 or SEQ ID NO:6,

wherein the isolated polypeptide either (a) specifically binds with an antibody that specifically binds with a polypeptide consisting of an amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:6, and SEQ ID NO:9, or (b) exhibits dipeptidyl carboxypeptidase activity.

2. The isolated polypeptide of claim 1, wherein the isolated polypeptide has an amino acid sequence that is at least 80% identical or at least 90% identical to the reference amino acid sequence.

3. The isolated polypeptide of claim 1, wherein the polypeptide comprises an amino acid sequence comprising the motif "[GSTALIVN]-x-x-H-E-[LIVMFYW]-{DEHRKP}-H-x-[LIVMFYWGSPQ]," where "x" is any amino acid residue, acceptable amino acid residues are listed between square brackets, and unacceptable amino acid residues are listed between braces.

4. The isolated polypeptide of claim 1, wherein the polypeptide comprises an extracellular domain, wherein the extracellular domain comprises amino acid residues 19 to 738 of the amino acid sequence of SEQ ID NO:2.

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5. The isolated polypeptide of claim 4, wherein the polypeptide further comprises a transmembrane domain that resides in a carboxyl-terminal position relative to the extracellular domain, wherein the transmembrane domain comprises amino acid residues 739 to 761 of SEQ ID NO:2.

6. The isolated polypeptide of claim 5, wherein the polypeptide further comprises an intracellular domain that resides in a carboxyl-terminal position relative to the transmembrane domain, wherein the intracellular domain comprises amino acid residues 762 to 805 of SEQ ID NO:2.

7. An isolated nucleic acid molecule that encodes a Zace2 polypeptide, wherein the nucleic acid molecule is selected from the group consisting of (a) a nucleic acid molecule comprising the nucleotide sequence of SEQ ID NO:3, (b) a nucleic acid molecule encoding an amino acid sequence that comprises amino acid residues 19 to 738 of SEQ ID NO:2, and (c) a nucleic acid molecule that remains hybridized following stringent wash conditions to a nucleic acid molecule comprising the nucleotide sequence of nucleotides 89-2449 of SEQ ID NO:1, or the complement of nucleotides 89-2449 of SEQ ID NO:1.

8. A vector, comprising the isolated nucleic acid molecule of claim 7, wherein the nucleic acid molecule encodes an amino acid sequence comprising amino acid residues 19 to 738 of SEQ ID NO:2.

9. An expression vector, comprising the isolated nucleic acid molecule of claim 7, wherein the nucleic acid molecule encodes an amino acid sequence comprising amino acid residues 19 to 738 of SEQ ID NO:2, a transcription promoter, and a transcription terminator, wherein the promoter is operably linked with the nucleic acid molecule, and wherein the nucleic acid molecule is operably linked with the transcription terminator.

10. A recombinant virus, comprising the expression vector of claim 9.

11. A recombinant host cell comprising the expression vector of claim 9, wherein the host cell is selected from the group consisting of bacterium, avian cell, yeast cell, fungal cell, insect cell, mammalian cell, and plant cell.

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12. A method of using the expression vector of claim 9 to produce *Zace2* protein, the method comprising the step of culturing recombinant host cells that comprise the expression vector and that produce the *Zace2* protein.

13. An antibody or antibody fragment that specifically binds with the polypeptide of claim 1.

14. An anti-idiotypic antibody, or anti-idiotypic antibody fragment, that specifically binds with the antibody or antibody fragment of claim 13, wherein the anti-idiotypic antibody, or anti-idiotypic antibody fragment, possesses dipeptidyl carboxypeptidase activity.

15. A composition, comprising a carrier and either the isolated polypeptide of claim 1, or at least one of an expression vector that comprises a nucleic acid molecule encoding the isolated polypeptide of claim 1 or a recombinant virus that comprises such an expression vector.

16. A method of detecting a product of *Zace2* gene expression in a biological sample, comprising the steps of:

(a) contacting a *Zace2* nucleic acid probe under hybridizing conditions with either (i) test RNA molecules isolated from the biological sample, or (ii) nucleic acid molecules synthesized from the isolated RNA molecules, wherein the probe has a nucleotide sequence comprising a portion of the nucleotide sequence of SEQ ID NO:1, or the complement of the nucleotide sequence of SEQ ID NO:1, and

(b) detecting the formation of hybrids of the nucleic acid probe and either the test RNA molecules or the synthesized nucleic acid molecules,

wherein the presence of the hybrids indicates the presence of *Zace2* RNA in the biological sample,

or

(a)' contacting the biological sample with an antibody, or an antibody fragment, of claim 13, wherein the contacting is performed under conditions that allow the binding of the antibody or antibody fragment to the biological sample, and

(b)' detecting any of the bound antibody or bound antibody fragment.

17. The isolated polypeptide of claim 1, wherein the polypeptide comprises amino acid residues 19 to 738 of the amino acid sequence of either SEQ ID NO:6 or SEQ ID NO:9.

18. An isolated nucleic acid molecule that encodes a Zace2 polypeptide, wherein the nucleic acid molecule is selected from the group consisting of (a) a nucleic acid molecule encoding an amino acid sequence that comprises amino acid residues 19 to 738 of SEQ ID NO:6, (b) a nucleic acid molecule encoding an amino acid sequence that comprises amino acid residues 19 to 738 of SEQ ID NO:9, and (c) a nucleic acid molecule that remains hybridized following stringent wash conditions to a nucleic acid molecule comprising the nucleotide sequence of nucleotides 106-2520 of SEQ ID NO:5, or the complement of nucleotides 106-2520 of SEQ ID NO:5.

19. An expression vector, comprising the isolated nucleic acid molecule of claim 18, wherein the nucleic acid molecule encodes an amino acid sequence comprising amino acid residues 19 to 738 of SEQ ID NO:6 or amino acid residues 19 to 738 of SEQ ID NO:9, a transcription promoter, and a transcription terminator, wherein the promoter is operably linked with the nucleic acid molecule, and wherein the nucleic acid molecule is operably linked with the transcription terminator.

20. A recombinant host cell comprising the expression vector of claim 19, wherein the host cell is selected from the group consisting of bacterium, yeast cell, fungal cell, insect cell, avian cell, mammalian cell, and plant cell.

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